XXIV. *Obſervations of Eclipſes of* Jupiter's *firſt Satellite made at the Royal Obſervatory at* Greenwich, *compared with Obſervations of the ſame, made by* Samuel Holland *Eſquire, Surveyor General of Lands for the Northern Diſtrict of* America, *and others of his Party, in ſeveral Parts of* North America, *and the Longitudes of the places thence deduced, by the Aſtronomer Royal.*

At the ISLAND OF ST. JOHN.					At GREENWICH.				
			Mean time.	Length of teleſcope.		Apparent time.	Length of tel.		Diff. of merid. from Greenwich, Weſt.
			h ′ ″	Feet		h ′ ″	Ft.		h ′ ″
1765	Jan. 27.	Em. 1.	9 36 31	10	Feb. 19.	13 46 42	6	Very good obſervation.	4 11 49
At LOUISBOURG.									
1766	Mar. 10.	Em. 1.	11 21 27	2 & 10	March 5.	7 43 55	6		4 0 16
	Apr. 25.	Em. 1.	11 46 50	2 & 10	April 11.	11 56 30	6		4 0 16
1767	Feb. 27.	Im. 1.	8 10 17	10	Feb. 27.	11 57 7	6		3 59 35
	Mar. 15.	Im. 1.	8 41 19	10	March 22.	14 28 48	6		3 59 48
	April 7.	Em. 1.	8 53 11	10	April 9.	7 20 1	6		3 59 55
	April 14.	Em. 1.	10 47 44	10	April 14.	14 47 52	6		4 0 26

On the SOUTH POINT at the entrance of the Bay of GASPEE. | At GREENWICH.

			Apparent time.	Length of tel.		Apparent time.	Length of tel.		Diff. of merid. from Greenwich, Weſt.
			h ′ ″	Ft.		h ′ ″	Ft.		h ′ ″
1768	Jan. 29.	Im. 1.	13 57 47	2	Jan. 22.	16 24 13½	6	Air very clear.	4 17 56
	April 25.	Em. 1.	9 39 40	2	April 25.	13 57 19	6		4 17 59
	May 9.	Em. 1.	13 30 54	2	May 11.	12 16 46	6		4 17 31

At Capt. HOLLAND's HOUSE, bearing S. 56 W. from QUEBEC, diſtant from caſtle of ST. LEWIS 2½ miles.

			Mean time.						
1769	Mar. 11.	Im. 1.	15 0 45	10					4 44 57
	April 3.	Im. 1.	15 10 22	10	Mar. 29.	12 25 7	2		4 44 28
	April 19.	Im. 1.	13 26 27	10	April 12.	16 16 8	2		4 44 41
	June 6.	Em. 1.	10 26 22	10	June 8.	9 40 56	6		4 44 42
1770	May 1.	Im. 1.	12 42 32	10	Mar. 16.	17 2 47	6		4 45 13

At KITTERY POINT, in the province of MAIN, in PISCATAQUA Harbour.

			Apparent time.			
1771	April 11.	Im. 1.	15 43 30	12	I ſuppoſe the error of the times computed in the Nautical Almanac in 1771, when the weather allowed me to obſerve no immerſions of this ſatellite, to be a mean between the errors in 1770 and 1772.	
	April 27.	Im. 1.	14 1 43	12		
	May 4.	Im. 1.	15 55 54	12		4 42 58

At PORTSMOUTH, in the Province of NEW HAMPSHIRE.

1772	Sept. 18.	Em. 1.	9 42 35	12	Sept. 27.	10 52 43½	3½	Air very clear.	4 43 2
	Oct. 11.	Em. 1.	10 5 4	12	Oct. 13.	9 17 4	3½	Air clear.	4 42 40
	Nov. 3.	Em. 1.	10 23 54	12	Oct. 20	11 14 18	3½	Air clear.	4 42 51
	Nov. 12.	Em. 1.	6 48 1	12	Nov. 14.	5 59 28	6	Air clear.	4 42 59

The

The obſervations here referred to, made by Capt. HOLLAND and others of his party, are to be found in Philoſophical Tranſactions, Vol. LVIII. for the year 1768, and Vol. LIX. for 1769, and other papers, ſent to me from Capt. HOLLAND, which I have the honour of preſenting to the Royal Society, together with this paper.

I have re-computed the times of Enſign SPROULE's obſervations made at GASPEE BAY, applying the equation of correſponding altitudes, which he had neglected; and have annexed them to his account of his obſervations, tranſmitted to me by Capt. HOLLAND.

It appears, that the obſervations of Capt. HOLLAND, and his party, were ſometimes made with a two feet reflector of SHORT's conſtruction, and ſometimes with an achromatic teleſcope of DOLLOND of 10, and at other times, one of 12 feet. The obſervations at the ROYAL OBSERVATORY were alſo made with different teleſcopes, at different times; ſometimes with a two feet reflector of SHORT's conſtruction; ſometimes with a treble object glaſs teleſcope of DOLLOND, of 3½ feet; but oftener with a 6 feet reflector, of SHORT's conſtruction. Theſe circumſtances are always noted againſt the obſervations: I have only made uſe of the obſervations of the firſt ſatellite, as being much more exact than thoſe of the others.

I reckon, that the 6-feet reflector ſhews an immerſion of the firſt ſatellite of Jupiter later, and an emerſion ſooner, by 20″, than a 2-feet reflector; or by 13″, than a 3½-feet treble object glaſs refractor, or a 10 or 12-feet double object glaſs refractor of DOLLOND.

LOND. Theſe allowances were accordingly made in deducing all the differences of meridians expreſſed in the laſt column of the foregoing table.

The obſervations made at GREENWICH, oppoſed to thoſe made in NORTH AMERICA, are either correſponding ones, which however is very ſeldom the caſe, or elſe the neareſt to them that were obſerved. The error of the computed time of the eclipſe in the Nautical Almanac was found by the neareſt obſervation at Greenwich, and the time of the Nautical Almanac, thus corrected, compared with the time obſerved in North America, gave the difference of meridians between the place and Greenwich; farther reduction being firſt made for the difference of teleſcopes, if neceſſary, in the manner already explained. It is however to be underſtood, that, in this way of deducing the difference of meridians, by comparing an eclipſe obſerved at Greenwich with *another* eclipſe obſerved elſewhere, the interval of time between the two eclipſes ought to be very ſhort; otherwiſe it cannot be ſuppoſed, that the errors of the tables ſhould continue the ſame. Hence it has happened, that many of the North American obſervations have been loſt for this uſe, for want of obſervations near enough to them made at Greenwich. In ſome other caſes, indeed, I have been obliged to compare together obſervations made with a greater interval between them than I ſhould have choſen, but for fear of loſing ſome uſeful compariſons. As the preceding table affords ſeveral determinations of the longitude of moſt of the places, it may be proper to point out, how the true difference of meridians may be beſt deduced. To take a mean of the ſeveral reſults will not be the proper method, except the ſeveral obſervations had been either *all* immerſions, or *all* emerſions; but when both immerſions and emerſions have been obſerved, then the beſt method will be, to take a mean of all the reſults given by the immerſions, and a mean of all the reſults given by the emerſions, ſeparately; the mean of theſe two means will be the true difference of the meridians, and will be much more to be depended upon, than if it was deduced from immerſions or emerſions only; becauſe this method of compariſon removes the conſtant errors ariſing from the differences of the teleſcopes, air, and eyes of the diſtant obſervers; theſe cauſes of error affecting the ſeparate reſults of immerſions and emerſions, in contrary ways. I ſhall now only add the difference of meridians deduced from the obſervations contained in the preceding table, by taking a proper mean between the ſeveral reſults.

Meridian of		h ′ ″
Place of obſervation on ST. JOHN'S iſland.	4 11 49 by ſingle obſervation.	
LOUISBOURG.	4 0 13 by mean of 4 E. 3 59 41 by mean of 2 I.	3 59 57 by mean of means.
SOUTH POINT, entrance of GASPEE.	4 17 56 by 1 I. 4 17 45 by mean of 2 E.	4 17 50 by mean of 1 I. and mean of E.
Capt. HOLLAND'S houſe near QUEBEC.	4 44 50 by mean of 4 I. 4 44 42 by 1 E.	4 44 46 by mean of 1 E. and mean of I.
KITTERY POINT, province of Main, in Piſcataqua harbour,	4 42 58 by mean of 3 I.	
PORTSMOUTH, NEW HAMPSHIRE.	4 42 53 by mean of 4 E.	

WEST of ROYAL OBSERVATORY at GREENWICH.

XV. *Immer-*